Surgical Site Infection Event (SSI)

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Introduction:

The CDC healthcare-associated infection (HAI) prevalence survey found that there were an estimated 110,800 surgical site infections (SSIs) associated with inpatient surgeries in 2015[1]. Based on the 2024 HAI data results published in the NHSN's HAI Progress Report, no significant changes in the SSI standardized infection ratio (SIR) related to all NHSN operative procedure categories combined compared to the previous year[2]. Additional SSI HAI data can be found in the annual HAI Progress Report[2].

While advances have been made in infection control practices, including improved operating room ventilation, sterilization methods, barriers, surgical technique, and availability of antimicrobial prophylaxis, SSIs remain a substantial cause of morbidity, prolonged hospitalization, and mortality. It is reported, SSI accounts for 20% of all HAIs and is associated to

a 2-to 11-fold increase in the risk of mortality with 75% of SSI-associated deaths directly attributable to the SSI[3,4]. SSI is the most costly HAI type with an estimated annual cost of $3.3 billion, and extends hospital length of stay by 9.7 days, with cost of hospitalization increased by more than $20,000 per admission[3,5].

Surveillance of SSI with feedback of appropriate data to surgeons has been shown to be an important component of strategies to reduce SSI risk[6-9]. A successful surveillance program includes the use of epidemiologically-sound infection definitions and effective surveillance methods, stratification of SSI rates according to risk factors associated with SSI development, and data feedback[7,8]. The *CDC and Healthcare Infection Control Practices Advisory Committee Guideline for the Prevention of Surgical Site Infection*, provides evidence-based strategies for SSI prevention[9]. Most recently, the *Strategies to prevent surgical site infections in acute-care hospitals: 2022 Update* was published providing acute-care hospitals with recommendations for SSI prevention[10].

Settings:

Surveillance of surgical patients will occur in any inpatient facility and/or hospital outpatient procedure department (HOPD) where the selected NHSN operative procedure(s) are performed.

Note: Ambulatory Surgery Centers (ASCs) that report to NHSN must use the Outpatient Procedure Component (OPC) to perform SSI surveillance. For purposes of NHSN surveillance and reporting this is defined as any distinct entity that operates exclusively for the purpose of providing surgical services to patients not requiring hospitalization and in which the expected duration of services would not exceed 24 hours following an admission.

Requirements:

- Perform surveillance for SSI following at least one NHSN operative procedure category (using the associated NHSN operative procedure codes) as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106).
- Collect SSI event (numerator) and operative procedure (denominator) data on all procedures included in the selected operative procedure categories indicated on the facility's Monthly Reporting Plan.
- All procedures included in the NHSN Monthly Reporting Plan are monitored for superficial incisional, deep incisional, and organ/space SSI events and the type of SSI reported must reflect the deepest tissue level where SSI criteria are met during the surveillance period.
- SSI events and the procedures to which they are linked are reported to NHSN regardless of noted evidence of infection at time of surgery.
- An SSI event is attributed to the facility in which the NHSN operative procedure is performed.

Surveillance Methods:

SSI monitoring requires active, patient-based, prospective surveillance. Concurrent and post-discharge surveillance methods should be used to detect SSIs following inpatient and outpatient operative procedures.

These methods include [but are not limited to]:

- Review of medical records or surgery clinic patient records
    - Admission, readmission, ED, and OR logs
    - Patient reported signs and symptoms of SSI
    - Lab, imaging, other diagnostic test reports
    - Clinician/healthcare professional notes
    - ICD-10-CM Infection Diagnosis Codes to prompt further review
- Visit the ICU and wards – talk to primary care staff
- Surgeon surveys by mail or telephone
- Patient surveys by mail or telephone (though patients may have a difficult time assessing their infections).

Any combination of these methods (or other methods identified by the facility) with the capacity to identify all SSIs is acceptable for use; however, NHSN criteria for SSI must be used. To minimize Infection Preventionists' (IPs) workload of collecting denominator data, operative procedure data may be imported. See file specifications at: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/ImportingProcedureData.pdf.

Operative Procedure Codes:

Operative procedure codes are used in health care settings to communicate uniform information. This wide use of operative procedure codes allows NHSN to incorporate the operative procedure codes to standardize NHSN SSI surveillance reporting. The operative procedure codes are **required** to determine the correct NHSN operative procedure category to be reported. Entering the operative procedure code into the NHSN application remains optional but is recommended.

NHSN uses the following operative procedure coding systems:

- *International Classification of Diseases, 10th Revision Clinical Modifications/Procedure Coding System* (ICD-10-CM/PCS), as defined by the ICD-10 Coordination and Maintenance Committee of the National Center for Health Statistics and the Centers for Medicare and Medicaid Services (CMS).
- *Current Procedural Terminology* (CPT), as defined by the American Medical Association (AMA).

The mapping for ICD-10-PCS and CPT NHSN operative procedures is found in the "Operative Procedure Code Documents" section of the Surgical Site Infection (SSI) Events page on the NHSN website. The mapping documents include a general definition for each NHSN operative procedure category as well as a description for each individual operative procedure code.

Note: For in-plan reporting purposes, only NHSN operative procedures are included in SSI surveillance. An infection associated with a procedure that is not included in one of the NHSN operative procedure categories is not considered an NHSN SSI, although the infection may be investigated as a healthcare-associate infection (HAI). SSI events can only be attributed to NHSN operative procedures.

Definition of an NHSN Operative Procedure:

An NHSN Operative Procedure is a procedure:

- that is included in the ICD-10-PCS and/or CPT NHSN operative procedure code mapping
  And
- takes place during an operation where at least one incision (including laparoscopic approach and cranial Burr holes) is made through the skin or mucous membrane, or entry is through an existing incision (such as an incision from a prior operative procedure)
  And
- takes place in an operating room (OR), defined as a patient care area that met the Facilities Guidelines Institute's (FGI) or American Institute of Architects' (AIA) criteria for an operating room when it was constructed or renovated[11]. This may include an OR, C-section room, interventional radiology room, or a cardiac catheterization lab.

SSI Event Details

The infection window period (IWP), present on admission (POA), healthcare-associated infection (HAI), and repeat infection timeframe (RIT) definitions do not apply to the SSI surveillance. For additional information on the POA designation not applying to SSI surveillance, see SSI Event Reporting Instruction #2. For details related to infection present at time of surgery (PATOS), see SSI Event Reporting Instruction #3.

Surveillance Period for SSI:

The timeframe following an NHSN operative procedure for monitoring and identifying an SSI event. The surveillance period is determined by the NHSN operative procedure category (for example, COLO has a 30-day SSI surveillance period and KPRO has a 90-day SSI surveillance period, see Table 2). Superficial incisional SSIs are monitored for a 30-day period for all procedure categories. Secondary incisional SSIs are monitored for a 30-day period regardless of the surveillance period for the primary site.

Each trip to the OR for an NHSN operative procedure sets an SSI surveillance period for the surgical site.

- If a patient returns to the OR for an **NHSN operative procedure** and the same surgical space is entered, the surveillance period for the prior NHSN operative procedure ends and a new SSI surveillance period begins at the conclusion of the procedure.
- If within the surveillance period following an NHSN operative procedure a **non-NHSN operative procedure** is performed, and all three tissue levels are entered, the SSI surveillance period for the NHSN operative procedure ends at the conclusion of the non-NHSN operative procedure. The SSI surveillance period continues for the tissue levels not entered during the non-NHSN operative procedure. No new surveillance period is set following a non-NHSN operative procedure.

Date of Event (DOE) for SSI:

For an SSI, the DOE is the date when the first element used to meet the SSI infection criterion occurs for the first time during the SSI surveillance period. The DOE must occur within the SSI surveillance period to meet SSI criteria. The type of SSI (superficial incisional, deep incisional, or organ/space) reported, and the DOE assigned must reflect the deepest tissue level where SSI criteria are met during the surveillance period. Synonym: infection date.

Timeframe for SSI elements:

The Infection Window Period (IWP), Present on Admission (POA), Healthcare-associated Infection (HAI), and Repeat Infection Timeframe (RIT) definitions do not apply to SSI surveillance. SSI surveillance is based on a 30- or 90-day SSI surveillance period, which is determined by the NHSN operative procedure category and the tissue level of SSI event. **SSI guidelines do not offer a strict timeframe for elements of criteria to occur** but historically, all elements used to meet an SSI criterion *generally* occur within a 7-10 day timeframe. To ensure that all elements associate to the SSI, the elements must be relational to one another. Each case differs based on the individual elements occurring and the type of SSI but the DOE for an SSI must occur within the appropriate 30- or 90-day SSI surveillance period.

Secondary BSI Scenarios for SSI:

For a bloodstream infection to be determined secondary to an SSI, one of the following scenarios must be met:

> **Scenario 1 (All levels of SSI):** At least one organism from the blood specimen matches an organism identified from the site-specific specimen that is used as an element to meet the NHSN SSI criterion AND the blood specimen is collected during the secondary BSI attribution period. The secondary BSI attribution period for SSI is a 17-day period that includes the SSI DOE, 3 days prior, and 13 days after.
>
> ***OR***
>
> **Scenario 2 (Organ/Space SSI Only):** An organism identified in the blood specimen is an element that is used to meet the NHSN Organ/Space SSI site-specific infection criterion and is collected during the timeframe for SSI elements.

For detailed instructions on determining whether identification of organisms from a blood specimen represents a secondary BSI, refer to the Secondary BSI Guide (Table B1 found within the BSI Event Protocol).

Denominator for Procedure Required Details

Additional guidance can be found within the Instructions for *Completion of Denominator for Procedure Form (CDC 57.121).*

ASA physical status:

Assessment by the anesthesiologist of the patient's preoperative physical condition using the American Society of Anesthesiologists' (ASA) Physical Status Classification System[12]. Patients are assigned an ASA score of 1-6 at time of surgery. Patients with an ASA score of 1-5 are eligible for NHSN SSI surveillance. Patients that are assigned an ASA score of 6 (a declared brain-dead patient whose organs are being removed for donor purposes) are **not** eligible for NHSN SSI surveillance.

Diabetes:

The NHSN SSI surveillance definition of diabetes indicates that the patient has a diagnosis of diabetes requiring management with insulin or a non-insulin anti-diabetic agent. This includes:

- Patients with "insulin resistance" who are on management with anti-diabetic agents.
- Patients with gestational diabetes.
- Patients who are noncompliant with their diabetes medications.

The ICD-10-CM diagnosis codes that reflect the diagnosis of diabetes are also acceptable for use to answer YES to the diabetes field question on the denominator for procedure entry if the codes are documented during the admission where the procedure is performed. These codes are found on the Surgical Site Infection (SSI) Events page section of the NHSN website under "Operative Procedure Code Documents".

Some patients may receive diabetic medications for indications other than diabetes. For purposes of NHSN reporting, the Diabetes field = NO, if there is no diagnosis of diabetes.

Duration of operative procedure:

The interval in hours and minutes between the Procedure/Surgery Start Time and the Procedure/Surgery Finish Time, as defined by the Association of Anesthesia Clinical Directors (AACD)[13]:

- Procedure/Surgery Start Time (PST): Time the procedure is begun (for example, incision for a surgical procedure).
- Procedure/Surgery Finish (PF): Time when all instrument and sponge count are completed and verified as correct, all postoperative radiologic studies to be done in the OR are completed, all dressings and drains are secured, and the physicians/surgeons have completed all procedure-related activities on the patient.

Emergency operative procedure:

A procedure that is documented per the facility's protocol to be an Emergency or Urgent procedure.

General anesthesia:

The administration of drugs or gases that enter the general circulation and affect the central nervous system to render the patient pain free, amnesic, unconscious, and often paralyzed with relaxed muscles. This does not include conscious sedation.

Height:

The patient's most recent height documented in the medical record in feet (ft.) and inches (in.), or meters (m).

Outpatient Status:

NHSN Inpatient Operative Procedure

An NHSN operative procedure performed on a patient whose date of admission to the healthcare facility and the date of discharge are different calendar days.

NHSN Outpatient Operative Procedure

An NHSN operative procedure performed on a patient whose date of admission to the healthcare facility and date of discharge are the same calendar day.

Closure Technique:

Non-primary Closure

The closure of the surgical wound in a way which leaves the skin level completely open following the surgery. Closure of any portion of the skin represents primary closure (see Primary Closure definition below). For surgeries with non-primary closure, the deep tissue layers may be closed by some means (with the skin level left open), or the deep and superficial layers may both be left completely open. Wounds with non-primary closure may or may not be described as "packed" with gauze or other material, and may or may not be covered with plastic, "wound vacs," or other synthetic devices or materials.

Examples:

- Laparotomy in which the incision was closed to the level of the deep tissue layers, sometimes called "fascial layers" or "deep fascia," but the skin level was left open.
- The abdomen is left completely open after the surgery (an "open abdomen").

Primary Closure

The closure of the skin level during the original surgery, regardless of the presence of wires, wicks, drains, or other devices or objects extruding through the incision. This category includes surgeries where the skin is closed by some means. Thus, if any portion of the incision is closed at the skin level, by any manner, a designation of primary closure should be assigned to the surgery.

Note: When a procedure has multiple incision/laparoscopic trocar sites and any of the incisions are closed primarily then the procedure technique is recorded as primary closed.

Scope:

An instrument used to reach and visualize the site of the operative procedure. In the context of an NHSN operative procedure, use of a scope involves creation of several small incisions to perform or assist in the performance of an operation rather than use of a traditional larger incision (specifically, open approach).

Procedure codes provide a reliable identification of the procedure approach. The fifth character of the ICD-10-PCS codes indicates the approach to reach the procedure site:

ICD-10 5th Character	Approach	NHSN Scope Designation
0	Open	NO
3	Percutaneous (Included only in CRAN and VSHN categories- procedures with BURR holes)	NO
4	Percutaneous endoscopic	YES
7	Via natural or artificial opening	NO
8	Via natural or artificial opening with endoscopic	NO
F	Via natural or artificial opening with percutaneous endoscopic assistance	YES

For CPT codes, the scope question can be answered based on the procedure code description. Using HYST code 58570 as an example, the procedure code description indicates Laparoscopy, surgical, with total hysterectomy. Laparoscopy is **Scope = YES**.

HYST	58570	Laparoscopy, surgical, with total hysterectomy, for uterus 250 g or less

Note: Scope is reported based on the primary incision site. If an ***open and scope*** code is assigned to procedures in the same NHSN procedure category, then the procedure should be reported to NHSN as **Scope = NO**. The ***open*** designation is considered a higher risk procedure.

Trauma:

Blunt or penetrating injury occurring prior to the start of the procedure. Complex trauma cases may require multiple trips to the OR during the same admission to repair the initial trauma. In such cases, Trauma = Yes.

Weight:

The patient's most recent weight documented in the medical record in pounds (lbs.) or kilograms (kg) prior to or otherwise closest to the procedure.

Wound class:

An assessment of the degree of contamination of a surgical wound at the time of the surgical procedure. Wound class is assigned by a person involved in the surgical procedure (for example, surgeon, circulating nurse, etc.) based on the wound class schema that is adopted within each organization [NHSN does not offer guidance on which wound class should be assigned]. The four wound classifications available within the NHSN application are the standard designations endorsed by the Association of periOperative Registered Nurses [AORN]:Clean (C), Clean-Contaminated (CC), Contaminated (CO), and Dirty/Infected (D]. [14]

The following operative procedure categories cannot be recorded as clean (C) within the application: APPY, BILI, CHOL, COLO, REC, SB, and VHYS. If a clean (C) wound class was assigned to a procedure in one of these procedure categories, the procedure cannot be included in the denominator for procedure data. The IP should not modify the wound class.

Table 1. Surgical Site Infection Criteria

Criterion	Surgical Site Infection (SSI)
	Superficial incisional SSI Must meet the following criteria:
	Date of event occurs within 30 days following the NHSN operative procedure (where day 1 = the procedure date) **AND** involves only skin and subcutaneous tissue of the incision **AND** patient has at least ***one*** of the following: a. purulent drainage from the superficial incision. b. organism(s) identified from an aseptically-obtained specimen from the superficial incision or subcutaneous tissue by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (for example, not Active Surveillance Culture/Testing [ASC/AST]) c. a superficial incision that is deliberately opened, re-accessed or aspirated by a surgeon, physician* or physician designee **AND** the surgeon, physician*, or physician designee initiates or continues antibiotic or antifungal therapy **on or in the two calendar days following the date of deliberate opening, re-access, aspiration** with a duration of two calendar days or longer **AND** patient has at least one of the following signs or symptoms: new or worsening localized pain or tenderness; localized swelling; erythema; or heat d. diagnosis of a superficial incisional SSI by a physician* or physician designee * The term physician for the purpose of application of the NHSN SSI criteria may be interpreted to mean a surgeon, infectious disease physician, emergency physician, other physician on the case, or physician's designee (Advanced Practice Nurse [APN], Physician's Assistant [PA]).

	Superficial incisional SSI
Comments	There are two specific types of superficial incisional SSIs: 1. Superficial Incisional Primary (SIP) – a superficial incisional SSI that is identified in the primary incision in a patient that has had an operation with one or more incisions (for example, C-section incision or chest incision for CBGB) 2. Superficial Incisional Secondary (SIS) – a superficial incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (for example, donor site incision for CBGB) **Note:** Refer to SSI Event Reporting Instruction #7 for NHSN operative procedure categories with secondary incision sites available for SSI attribution.
Reporting Instructions for Superficial incisional SSI	**The following do not qualify as criteria for meeting the NHSN definition of superficial incisional SSI:** • Diagnosis/treatment of cellulitis ALONE does not meet superficial incisional SSI criterion 'd'. • A stitch abscess ALONE (minimal inflammation and discharge confined to the points of suture penetration/staple penetration site). • A localized stab wound or pin site infection; depending on the depth, these infections might be considered either an HAI skin (SKIN) or soft tissue (ST) infection. **Notes**: • For the purpose of NHSN surveillance, the term "incision" refers to the incision made for the primary surgical procedure and the term "stab wound" refers to an incision made at another site, generally to accommodate a drain. For an NHSN operative procedure, a laparoscopic trocar site is considered a surgical incision and not a stab wound. If a surgeon uses a laparoscopic trocar site to place a drain at the end of a procedure this is considered a surgical incision.

	Deep incisional SSI Must meet the following criteria:
	Date of event occurs within 30 or 90 days following the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 2 **AND** involves deep soft tissues of the incision (for example, fascial and muscle layers) **AND** patient has at least ***one*** of the following: a. purulent drainage from the deep incision b. organism(s) identified from the deep soft tissues of the incision by a culture- or nonculture- based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (for example, not Active Surveillance Culture/Testing [ASC/AST]) c. a deep incision that is deliberately opened†, re-accessed, or aspirated by a surgeon, physician‡ or physician designee or spontaneously dehisces¶ **AND** the surgeon, physician‡, or physician designee initiates or continues antibiotic or antifungal therapy **on or in the two calendar days following the date of deliberate opening, re-access, aspiration or spontaneous dehiscence¶** with a duration of two calendar days or longer **AND** patient has at least ***one*** of the following signs or symptoms: fever (>38°C); new or worsening localized pain or tenderness d. an abscess, or other evidence of infection involving the deep incision detected on gross anatomical exam, histopathologic exam, or imaging test †*Excludes any known multi-part/multi-phase procedures that occur over more than one operative episode [during the same admission] that is documented in the medical record by a surgeon prior to or during the first operative procedure [for example, a plan to return to OR that is documented in the operative narrative of the first procedure would be eligible for use].* ‡The term physician for the purpose of application of the NHSN SSI criteria may be interpreted to mean a surgeon, infectious disease physician, emergency physician, other physician on the case, or physician's designee (Advanced Practice Nurse [APN], Physician's Assistant [PA]).

	¶ Spontaneous dehiscence is defined as a re-opening of a surgical incision that is not due to external factors such as direct trauma.
Comments	**Deep incisional SSI**
	There are two specific types of deep incisional SSIs: 1. Deep Incisional Primary (DIP) – a deep incisional SSI that is identified in a primary incision in a patient that has had an operation with one or more incisions (for example, C-section incision or chest incision for CBGB) 2. Deep Incisional Secondary (DIS) – a deep incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (for example, donor site incision for CBGB) **Note:** Refer to SSI Event Reporting Instruction #7 for NHSN operative procedure categories with secondary incision sites available for SSI attribution.

	Organ/Space SSI Must meet the following criteria:
	Date of event occurs within 30 or 90 days following the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 2 **AND** involves the organ/space tissues (deeper than the fascia/muscle) **AND** patient has at least ***one*** of the following: a. purulent drainage from a drain placed into the organ/space (for example, closed suction drainage system, open drain, T-tube drain, CT-guided drainage) b. organism(s) identified from fluid or tissue in the organ/space by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (for example, not Active Surveillance Culture/Testing [ASC/AST]) c. an abscess or other evidence of infection involving the organ/space detected on: • gross anatomical exam or • histopathologic exam or • imaging test evidence definitive or equivocal for infection **AND** meets at least ***one*** eligible [per Appendix A]criterion for a specific organ/space infection site listed in Table 3. These criteria are found in the Surveillance Definitions for Specific Types of Infections (Chapter 17).
Comments	Examples of gross anatomic evidence of organ/space infection: • An intraabdominal abscess will require an invasive procedure to actually visualize the abscess. • Visualization of pus or purulent drainage (includes from a drain). • Abdominal, pelvic or uterine pain or tenderness **post Cesarean section (CSEC) or hysterectomy (HYST or VHYS)** is sufficient gross anatomic evidence of infection without an invasive procedure to meet general Organ/Space SSI criterion 'c' **when a Chapter 17 Reproductive Tract Infection criteria is met**. Allowing the documentation of abdominal pain or tenderness as gross anatomic evidence of infection to meet general Organ/Space SSI criterion 'c' enables the user to report an SSI-OREP, SSI-EMET or SSI-VCUF event. Abdominal pain or tenderness cannot be applied as 'other evidence of infection on gross anatomic exam' to meet Deep Incisional SSI criterion 'c' or to meet any Chapter 17 site-specific criterion (for example, OREP '2').

Table 2. Surveillance Periods for SSI Following Selected NHSN Operative Procedure Categories. Day 1 = the date of the procedure.

30-day Surveillance			
Category	**Operative Procedure**	**Category**	**Operative Procedure**
AAA	Abdominal aortic aneurysm repair	LAM	Laminectomy
AMP	Limb amputation	LTP	Liver transplant
APPY	Appendix surgery	NECK	Neck surgery
AVSD	Shunt for dialysis	NEPH	Kidney surgery
BILI	Bile duct, liver or pancreatic surgery	OVRY	Ovarian surgery
CEA	Carotid endarterectomy	PRST	Prostate surgery
CHOL	Gallbladder surgery	REC	Rectal surgery
COLO	Colon surgery	SB	Small bowel surgery
CSEC	Cesarean section	SPLE	Spleen surgery
GAST	Gastric surgery	THOR	Thoracic surgery
HTP	Heart transplant	THYR	Thyroid and/or parathyroid surgery
HYST	Abdominal hysterectomy	VHYS	Vaginal hysterectomy
KTP	Kidney transplant	XLAP	Exploratory laparotomy

90-day Surveillance	
Category	**Operative Procedure**
BRST	Breast surgery
CARD	Cardiac surgery
CBGB	Coronary artery bypass graft with both chest and donor site incisions
CBGC	Coronary artery bypass graft with chest incision only
CRAN	Craniotomy
FUSN	Spinal fusion
FX	Open reduction of fracture
HER	Herniorrhaphy
HPRO	Hip prosthesis
KPRO	Knee prosthesis
PACE	Pacemaker surgery
PVBY	Peripheral vascular bypass surgery
VSHN	Ventricular shunt

Notes:

- Superficial incisional SSIs are monitored for a 30-day period for all procedure categories.
- Secondary incisional SSIs are monitored for a 30-day period regardless of the surveillance period for the primary incision site.

Table 3. Specific Sites of an Organ/Space SSI

Category	Specific Site	Category	Specific Site
BONE	Osteomyelitis	MED	Mediastinitis
BRST	Breast abscess or mastitis	MEN	Meningitis or ventriculitis
CARD	Myocarditis or pericarditis	ORAL	Oral cavity infection (mouth, tongue, or gums)
DISC	Disc space infection	OREP	Deep pelvic tissue infection or other infection of the male or female reproductive tract
EAR	Ear, mastoid infection	PJI	Periprosthetic joint infection
EMET	Endometritis	SA	Spinal abscess/infection
ENDO	Endocarditis	SINU	Sinusitis
GIT	Gastrointestinal (GI) tract infection	UR	Upper respiratory tract, pharyngitis, laryngitis, epiglottitis
IAB	Intraabdominal infection, not specified elsewhere	USI	Urinary System Infection
IC	Intracranial infection	VASC	Arterial or venous infection
JNT	Joint or bursa infection	VCUF	Vaginal cuff infection
LUNG	Other infection of the lower respiratory tract		

Criteria for these sites can be found in Chapter 17, Surveillance Definitions for Specific Types of Infections.

Appendix A contains a complete list of all NHSN operative procedure categories and the corresponding site-specific SSIs that may be attributable to each category.

SSI Event (Numerator) Reporting

Numerator Data:

All patients having any of the procedures included in the selected NHSN operative procedure category(s) are monitored for SSI. The Surgical Site Infection (SSI) form is completed for each SSI. If no SSI events are identified during the surveillance month, check the "Report No Events" field in the Missing PA Events tab of the Incomplete/Missing List in the NHSN application.

The *Instructions for Completion of the Surgical Site Infection Form (CDC 57.120)* include brief instructions for collection and entry of each data element on the form. The SSI form includes patient demographic information and specific event details that pertain to the SSI event.

SSI Event Reporting Instructions:

1. **Excluded organisms:** Organisms that primarily cause community-associated infections and are not known to (or rarely) cause healthcare-associated infections or surgical site infections, are excluded and cannot be used to meet any NHSN definition.
    - **Fungi:** *Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus, Pneumocystis*
    - **Vector-borne bacteria:** *Anaplasma spp., Ehrlichia spp., Borrelia spp, Rickettsia spp.*

    In addition, organisms associated with latent infections (for example, herpes, shingles, syphilis, or tuberculosis) are excluded from meeting SSI criteria.

2. **Attributing SSI to an NHSN operative procedure when there is evidence of infection at the time of the primary surgery:** The present on admission (POA) definition does not apply to the SSI protocol. If evidence of infection is present at the time of the procedure and the patient meets SSI criteria within the SSI surveillance period following the procedure, an SSI is attributed to the procedure (for guidance on PATOS determination, see SSI Event Reporting Instruction #3).

3. **Infection present at time of surgery (PATOS):** PATOS is a YES/NO field found on the SSI event form. PATOS denotes there was evidence of infection visualized (seen) during the surgical procedure to which a subsequent SSI is attributed. The evidence of infection must be noted intraoperatively and documented within the narrative portion of the operative note or report of surgery to be eligible for PATOS (pre/post op diagnoses, 'indication for surgery', and other headings routinely included in an operative note are not eligible with answering PATOS).

    Key points for consideration:

    a) Only select PATOS = YES when it applies to the depth of the SSI that is being attributed to the procedure. Examples:

    - When a patient has documentation of an intraabdominal infection at time of surgery and then later returns with an organ/space SSI, PATOS = YES.

- When a patient has documentation of an intraabdominal infection at time of surgery and then later returns with a superficial or deep incisional SSI, PATOS = NO.

b) Examples of verbiage that is considered evidence of infection include but are not limited to: abscess, infection, purulence/pus, phlegmon, osteomyelitis, "feculent peritonitis", or a sinus tract [for HPRO/KPRO procedures ONLY]. A ruptured appendix is evidence of infection at the organ/space level.

c) Examples of verbiage that is **not** considered evidence of infection include but are not limited to: colon perforation, contamination, necrosis, gangrene, fecal spillage, nicked bowel during procedure, murky fluid, or documentation of inflammation.

d) The use of the ending "itis" in an operative note/report of surgery does not automatically meet PATOS, as it may only reflect inflammation which is not infectious in nature (for example, diverticulitis, peritonitis, and appendicitis).

e) Pathology report findings and imaging test findings cannot be used for PATOS determination.

f) Identification of an organism using culture or non-culture based microbiologic testing method or on a pathology report from a surgical specimen cannot be used for PATOS determination.

g) Wound class assignment cannot be used for PATOS determination.

h) Trauma resulting in a contaminated case does not automatically meet the PATOS requirement. For example, a fresh gunshot wound to the abdomen may be a trauma with a high wound class but there would not be time for infection to develop.

i) For C-Section [CSEC] procedures ONLY: chorioamnionitis [including suspected chorioamnionitis] documented in the operative narrative is eligible for use for PATOS at the organ/space tissue level.

Examples of PATOS application:

- A patient undergoes an XLAP where there is a finding of a ruptured appendix and an APPY is performed. Two weeks later the patient meets criteria for an organ/space IAB SSI. The PATOS field is selected as YES since a ruptured appendix is noted at time of surgery in the same tissue level as the subsequent SSI.

- During a COLO procedure the surgeon documents multiple abscesses in the intraabdominal cavity. Patient returns three weeks later and meets criteria for a superficial incisional SSI. The PATOS field is selected as NO since there was no documentation of evidence of infection of the superficial tissues at time of the COLO.

- During a CSEC the surgeon nicks the bowel and there is contamination of the intraabdominal cavity. One week later the patient meets criteria for an organ/space

OREP SSI. The PATOS field is selected as NO since there is no documentation of evidence of infection at the time of the CSEC. The colon nick is a complication but there is not infection present at time of surgery.

- Patient undergoes an AMP due to chronic ischemia. The patient returns two weeks later and meets criteria for a deep incisional SSI. The PATOS field is selected as NO since there is not documentation of evidence of infection at time of the AMP. Chronic ischemia is not sufficient for evidence of infection.

Note: For more information about PATOS, see Quick Learn titled "Surgical Site Infection (SSI) Event PATOS – Infection Present at Time of Surgery".

4. **Multiple tissue levels are involved in the infection:** The type of SSI (superficial incisional, deep incisional, or organ/space) reported must reflect the deepest tissue level where SSI criteria are met during the surveillance period. The DOE assigned is the date of the first element used to meet the SSI criteria at the deepest tissue level that is met.
    - Report infection that meets criteria for organ/space SSI as an organ/space SSI, regardless of superficial or deep tissue involvement.
    - Report infection that meets criteria for deep incisional SSI as a deep incisional SSI, regardless of superficial tissue involvement.
    - If a patient meets criteria for a deep incisional SSI on day 10 of the SSI surveillance period and a week later (day 17 of the SSI surveillance period) the patient meets criteria for an organ/space SSI, the DOE assigned is the date of the organ/space SSI.

5. **Attributing SSI to a NHSN procedure when several are performed on different dates:** Each trip to the OR for an NHSN operative procedure sets an SSI surveillance period. When a patient has several NHSN operative procedures performed on different dates, attribute the SSI to the most recently performed NHSN operative procedure [for which the patient is in an SSI surveillance period for]

    Note: For multiple NHSN operative procedures performed within a 24-hour period, see Denominator Reporting Instruction #7.

6. **Attributing SSI to NHSN procedures that involve multiple primary incision sites:** When multiple primary incision sites of the same NHSN operative procedure become infected, report as a single SSI, and assign the type of SSI (superficial incisional, deep incisional, or organ/space) that represents the deepest tissue level where SSI criteria are met at any of the involved primary incision sites during the surveillance period. Examples:

- If one laparoscopic incision meets criteria for a superficial incisional SSI and another laparoscopic incision meets criteria for a deep incisional SSI, report one deep incisional SSI.
- If one or more laparoscopic incision sites meet criteria for superficial incisional SSI but the patient also has an organ/space SSI related to the procedure, report one organ/space SSI.
- If an operative procedure is limited to a single breast and involves multiple incisions in that breast that become infected, report a single SSI.
- In a colostomy formation or reversal (take down) procedure, the stoma and other abdominal incision sites are considered primary incisions. If both the stoma and another abdominal incision site develop superficial incisional SSI, report as one SSI (SIP).

7. **Attributing SSI to NHSN operative procedures that have secondary incision sites**: Certain procedures can involve secondary incisions (specifically, BRST, CBGB, CEA, FUSN, PVBY, REC, and VSHN). Secondary incision sites are monitored for Superficial Incisional Secondary (SIS) SSI and Deep Incisional Secondary (DIS) SSI. The surveillance period for all secondary incision sites is 30 days, regardless of the required deep incisional or organ/space SSI surveillance period for the primary incision site(s) (Table 2). Procedures meeting this designation are reported as one operative procedure, although up to two SSI events can be reported linked to the procedure (a primary incision site SSI and a secondary incision site SSI). For example:
    - A saphenous vein harvest incision site in a CBGB procedure is considered the secondary incision site. One CBGB procedure is reported, the saphenous vein harvest site is monitored for 30 days following surgery for SSI, and the chest incision is monitored for 90 days following surgery for SSI. If the patient meets criteria for an SSI at the saphenous vein harvest site (such as a superficial incisional SSI) and meets criteria for an SSI at the chest site (such as a deep incisional SSI) two SSIs are reported and linked to the CBGB procedure.
    - A tissue harvest site (for example, Transverse Rectus Abdominis Myocutaneous [TRAM] flap) in a BRST procedure is considered the secondary incision site. One BRST procedure is reported, and if the secondary incision site becomes infected, report as either SIS or DIS as appropriate.

8. **SSI detected at another facility:** An SSI event is reported by the facility where the NHSN operative procedure was performed. When a potential SSI is detected at a facility other than the one where the procedure was performed, enough detail is provided to the reporting facility in the event an SSI should be reported to NHSN. If an SSI is determined, the reporting facility should indicate **Detected = RO** (patient readmission to a facility

other than where procedure was performed) on the SSI event form when reporting the SSI.

9. **SSI attribution after multiple categories of NHSN procedures are performed during a single trip to the OR:** When more than one NHSN operative procedure category is performed through a single incision/laparoscopic site(s) during a single trip to the operating room, attribute the SSI to the procedure associated to the infection. When attribution is not clear, use the NHSN Principal Operative Procedure Category Selection Lists (Table 4) to select the operative procedure to which the SSI should be attributed. For example, when a patient meets criteria for an SSI after a single trip to the OR in which both a COLO and SB were performed, and the source of the SSI is not apparent, assign the SSI to the COLO procedure per Table 4.

   The final decision for **SSI attribution lies with the local facility based on the full details of the case as documented in the medical record**. It is critical that documentation is included which supports the SSI attribution.

10. **SSI following invasive manipulation or accession of the operative site:** An SSI will **NOT** be attributed when the following 3 criteria are ALL met:

    - during the post-operative period there is no suspicion or evidence of infection related to the surgical site/space.
      And
    - an invasive manipulation or accession of the site/space is performed for diagnostic or therapeutic purposes (for example, needle aspiration, accession of ventricular shunts, accession of breast expanders).
      And
    - an infection subsequently develops in a tissue level which was entered during the manipulation/accession.

    Notes:

    - Suspicion or evidence of infection may include signs and symptoms of infection (for example, fever or pain) depending on the site of the procedure.
    - Tissue levels not manipulated/accessed are still eligible for SSI. For example, a superficial debridement following a COLO procedure, where the muscle/fascia and organ/space is not entered, a subsequent deep incisional or organ/space SSI following the debridement may be an SSI attributable to the COLO procedure.
    - This reporting instruction does NOT apply to closed manipulation (for example, closed reduction of a dislocated hip after an orthopedic procedure).

- Invasive manipulation does not include wound packing or changing of wound packing materials as part of postoperative care.
- Routine flushing of catheters as part of the facility's standard care and maintenance is not considered invasive manipulation.
- Each trip to the OR for an NHSN operative procedure sets an SSI surveillance period for the surgical site.

11. **Reporting instructions for post-operative infection scenarios:** An SSI should be reported to NHSN without regard to post-operative accidents, falls, inappropriate showering or bathing practices, or other occurrences that may or may not be attributable to patients' intentional or unintentional postoperative actions. An SSI should also be reported regardless of the presence of certain skin conditions (for example, dermatitis, blister, impetigo) noted near an incision, and regardless of the possible occurrence of a "seeding" event from an unrelated procedure (for example, dental work). This instruction concerning various postoperative circumstances is necessary to reduce subjectivity and data collection burden.

Table 4. NHSN Principal Operative Procedure Category Selection List

(The categories with the highest risk of SSI are listed before those with lower risks.)

Priority	Category	Abdominal Operative Procedures
1	LTP	Liver transplant
2	COLO	Colon surgery
3	BILI	Bile duct, liver or pancreatic surgery
4	SB	Small bowel surgery
5	REC	Rectal surgery
6	KTP	Kidney transplant
7	GAST	Gastric surgery
8	AAA	Abdominal aortic aneurysm repair
9	HYST	Abdominal hysterectomy
10	CSEC	Cesarean section
11	XLAP	Laparotomy
12	APPY	Appendix surgery
13	HER	Herniorrhaphy
14	NEPH	Kidney surgery
15	VHYS	Vaginal hysterectomy
16	SPLE	Spleen surgery
17	CHOL	Gall bladder surgery
18	OVRY	Ovarian surgery
Priority	**Category**	**Thoracic Operative Procedures**
1	HTP	Heart transplant
2	CBGB	Coronary artery bypass graft with donor incision(s)
3	CBGC	Coronary artery bypass graft, chest incision only
4	CARD	Cardiac surgery
5	THOR	Thoracic surgery
Priority	**Category**	**Neurosurgical (Brain/Spine) Operative Procedures**
1	VSHN	Ventricular shunt
2	CRAN	Craniotomy
3	FUSN	Spinal fusion
4	LAM	Laminectomy
Priority	**Category**	**Neck Operative Procedures**
1	NECK	Neck surgery
2	THYR	Thyroid and or parathyroid surgery

Denominator for Procedure Reporting

Denominator Data:

Denominator data are collected for each individual NHSN operative procedure category selected for monitoring on the *Patient Safety Monthly Reporting Plan*. For all patients having any of the procedures included in the NHSN operative procedure category(s) for which SSI surveillance is being performed during the month, complete the *Denominator for Procedure* form. An operative procedure code (ICD-10-PCS and/or CPT) is required to determine the correct NHSN operative procedure category to be reported. The *Instructions for Completion of the Denominator for Procedure Form (57.121)* include brief instructions for collection and entry of each data element on the form.

Denominator Reporting Instructions:

1. **Different operative procedure categories performed during same trip to the OR:** When procedures in more than one NHSN operative procedure category are performed during the same trip to the operating room through the same or different incisions, a *Denominator for Procedure* form is completed for each NHSN operative procedure category being monitored in the Monthly Reporting Plan.
   For example:
   - If a CARD and CBGC are performed through the same incision during the same trip to the operating room, and both procedures are monitored in the Monthly Reporting Plan, complete a *Denominator for Procedure* form for each procedure.
   - If following a motor vehicle accident, a patient has an FX and SPLE performed during the same trip to the operating room, and both procedures are monitored in the Monthly Reporting Plan, complete a *Denominator for Procedure* form for each procedure.

   EXCEPTION: If a patient has both a CBGC and CBGB during the same trip to the operating room, report only as a CBGB. Only report as a CBGC if there is only a chest incision. CBGB and CBGC are never reported for the same patient for the same trip to the operating room.

2. **Duration of the operative procedures when more than one category of NHSN operative procedure is performed through the same incision:** If more than one NHSN operative procedure category is performed through the same incision during the same trip to the OR, record the combined duration of all procedures, which is the time from procedure/surgery start time to procedure/surgery finish time. For example, if a CBGC and a CARD are performed on a patient during the same trip to the operating room, the time from start time to finish time is reported for both operative procedures.

3. **Duration of operative procedures if patient has two different NHSN operative procedures performed via separate incisions on the same trip to the OR:** Try to determine the correct duration for each separate procedure (if this is documented); otherwise, take the time for both procedures and split it evenly between the two. For example, if an AMP and SPLE are performed during the same trip to the OR.

4. **Same operative procedure category but different ICD-10-PCS or CPT codes during same trip to the OR:** If procedures of different ICD-10-PCS or CPT codes from the same NHSN operative procedure category are performed through the same incision/laparoscopic sites, record one procedure for that category. For example, a facility is performing surveillance for CARD procedures and a patient undergoes a replacement of both the mitral and tricuspid valves during the same trip to the operating room (two CARD procedure codes are assigned). Complete one CARD *Denominator for Procedure* form because both procedures are in the same operative procedure category (CARD).

5. **For revision HPRO and KPRO procedures:** If total or partial revision HPRO or KPRO is performed, determine if any of the ICD-10-PCS/CM diagnosis or procedure codes indicating infection (see link below) were assigned to the index joint in the 90 days prior to and including the index HPRO or KPRO revision. If any of the specified codes are assigned to the procedure, indicate on the *Denominator for Procedure* form that the revision was associated with 'prior infection at index joint' = YES. The 'prior infection at index joint' variable only applies to *revision* HPRO and KPRO. The cases designated 'prior infection at index joint' = YES should be validated before the procedure is submitted to NHSN. This validation is necessary to ensure the code is aligned with the index joint revision. The ICD-10-PCS/CM code mapping guidance is found on the NHSN website in the SSI section under "Operative Procedure Code Documents."

6. **Same NHSN operative procedure category via separate incisions:** For operative procedures that can be performed via separate incisions during same trip to the operating room (specifically the following, AMP, BRST, CEA, FUSN, FX, HER, HPRO, KPRO, LAM, NEPH, OVRY, PVBY), separate *Denominator for Procedure* forms are completed. To document the duration of the procedures, indicate the procedure/surgery start time to procedure/surgery finish time for each procedure separately or, alternatively, take the total time for the procedures and split it evenly between procedures. Appendix B provides guidance for the 12 NHSN operative procedure categories that can have multiple procedures reported per category per patient per calendar day.

   Notes:
   - A COLO procedure with a colostomy formation is considered one COLO procedure with multiple primary incision sites.
   - Laparoscopic hernia repairs are considered one HER procedure, regardless of the number of hernias repaired in a trip to the OR. In most cases there will be only one incision time documented for this procedure. If more than one time is documented, total the durations. Open (specifically, non-laparoscopic) hernia repairs are reported as one

HER procedure for each hernia repaired via a separate incision, (specifically, if two incisions are made to repair two defects, then two HER procedures are reported). It is anticipated that separate incision times will be recorded for these procedures. If not, take the total time for both procedures and split it evenly between the two.

7. **More than one operative procedure through same incision/surgical space within 24 hours:** When a patient has more than one operative procedure via the same incision or into the same surgical space and the second procedure start time is within 24 hours of the first procedure finish time, report one *Denominator for Procedure* form for the original procedure, combining the durations for both procedures based on the procedure start times and finish times for both procedures.
    - For example, a patient has a CBGB lasting 4 hours and returns to the OR six hours later for another operative procedure via the same incision (for example, CARD). The second operation has duration of 1.5 hours. Record the operative procedure as one CBGB and the duration of operation as 5 hour 30 minutes. If the wound class has changed, report the higher wound class. Do not report the CARD procedure in your denominator data.

    Notes:
    - If the first procedure is **not** an NHSN operative procedure, this guidance does not apply.
    - If the second procedure is **not** an NHSN operative procedure, this guidance does still apply
    - When the patient returns to the OR within 24 hours of the end of the first procedure assign the surgical wound closure technique that applies when the patient leaves the OR from the first operative procedure.
    - If the ASA class has changed in the second procedure, report the higher ASA class.
    - The surveillance period for the procedure reported begins at the completion of the second procedure.

8. **Patient expires in the OR:** If a patient expires in the operating room, do not complete a *Denominator for Procedure* form. This operative procedure is excluded from the denominator.

9. **HYST or VHYS:** For the purpose of NHSN SSI reporting, hysterectomy procedure codes that involve an incision made into the abdomen, including trocar insertion, are listed in the abdominal hysterectomy (HYST) category. The correct CPT hysterectomy procedure codes should be assigned by a medical record coder using current guidelines and conventions. Hysterectomy procedures should be designated as a HYST or VHYS, based on the approach of the procedure (5th character of the ICD-10 operative procedure code) the facility's medical coder assigns to the hysterectomy procedure.

Procedure	ICD-10 5th Character	Approach
HYST	0	Open
	4	Percutaneous endoscopic
	F	Via natural or artificial opening with percutaneous endoscopic assistance
VHYS	7	Via natural or artificial opening
	8	Via natural or artificial opening with endoscopic

Data Analyses

Once procedure (denominator) and SSI (numerator) data are collected and entered into NHSN, the data can be analyzed/visualized in various ways including with descriptive analysis reports and standardized infection ratio (SIR) reports.

Types of SSI Analyses Reports

Descriptive analysis reports

Descriptive analysis report options, such as line listings, frequency tables, and bar and pie charts are available for numerator and denominator data.
Line lists, frequency tables, and rate tables are also available to analyze pathogens and antimicrobial susceptibility data reported for each SSI. See the NHSN Analysis website for quick reference guides on how to access, generate and interpret SSI data using any of these report types: https://www.cdc.gov/nhsn/ps-analysis-resources/reference-guides.html

SSI Basic Rate Index Reports

SSI rates per 100 operative procedures are calculated by dividing the number of SSIs by the number of operative procedures and multiplying the results by 100. SSIs will be included in the numerator of a rate based on the date of procedure, not the date of event (DOE), because the procedure bears the risk for infection. SSI rate calculations can be performed separately for the different types of operative procedures and stratified by the basic risk index using the Rate Table reports located in the SSI subfolder of the All Procedure-Associated Events folder in the HAI Detailed Reports (Line List, Rate Tables, etc.) folder in the Analysis Reports feature of the NHSN application. The universal exclusion criteria and SIR inclusion criteria do not apply in the calculation of the SSI rate. The SSI rate includes PATOS events and outpatient procedures but excludes procedures with non-primary closure techniques. Additional information regarding the basic risk index calculation can be found in the paper:
https://www.cdc.gov/nhsn/pdfs/datastat/2009NHSNReport.pdf

SSI SIR Reports

The SIR is calculated by dividing the number of observed infections by the number of predicted infections. The SIR will be calculated only if the number of predicted HAIs ("numPred" in the NHSN application) is ≥ 1 to help enforce a minimum precision criterion.

$$SIR = \frac{\text{Observed (O)}HAIs}{\text{Predicted (P)}HAIs}$$

The number of predicted infections is calculated using SSI probabilities estimated from multivariate logistic regression models constructed from NHSN data during a baseline time period, which represents a standard population's SSI experience. There are three NHSN baseline periods, 2006-2008, 2015 and 2022 baselines. For the 2 more recent baselines, the procedures/SSI occurring in adults are modeled separately from those occurring in pediatrics. Also, the procedures/SSI occurring in inpatient setting are modeled separate from those occurring in hospital outpatient procedure department (HOPD) setting.

The SSI SIR can be generated for individual procedures for different summary time periods. While the SSI SIR can be calculated for single procedure categories and for specific surgeons, the measure also allows you to summarize your data across multiple procedure categories while adjusting for differences in the estimated probability of infection among the patients included across the procedure categories. For example, you will be able to obtain one SSI SIR adjusting for all procedures reported. Alternatively, you can obtain one SSI SIR for a single procedure category such as colon surgery only within your facility.

Additional Notes about SSI SIRs

Inclusion Notes	**Original Baseline for SSI SIR 2006-2008 (Baseline Set 1 or BS1)**	**2015 Baseline (Baseline Set 2 or BS2) 2022 Baseline (Baseline Set 3 or BS3)**
Closure technique	SIR calculation includes only procedures reported with a primary closure (PRI) method	SIR calculation includes procedures with either primary (PRI) and non-primary closure (OTH) methods
Infection present at time of infection (PATOS)	SIR calculation includes PATOS events and associated procedure	SIR calculation excludes PATOS events and associated procedure

SSI SIR Models and Reports

There are three main SSI SIR Models available from NHSN, each briefly described in the table below. SSIs are included in the numerator of an SIR based on the date of procedure, not the date of event. This is because the procedure carries the risk for the infection/SSI.

The first two models, the All-SSI SIR and the Complex A/R SSI SIR models, are available for all NHSN operative procedures/SSI occurring in both adults and pediatric patients, while the third model, the Complex 30-day SSI SIR is available for colon and abdominal hysterectomy procedures/SSI occurring in adults only. Please see the NHSN SIR Guide for more model specific information:

For the 2015 baseline model details: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf

For the 2022 baseline model details: https://www.cdc.gov/nhsn/2022rebaseline/sir-guide.pdf

Table 5: Inclusion Criteria of SSI in SIR Models

All SSI SIR Model	• Includes separate models for inpatient and hospital outpatient procedures (under the 2015 baseline) • Includes Superficial, Deep & Organ/Space SSIs • Superficial & Deep incisional SSIs limited to primary incisional SSIs only • Includes SSIs identified on admission, readmission & via post-discharge surveillance • Separate models for patient population (pediatric data is separated from adult data)
Complex A/R SSI Model	• Includes only Deep incisional primary SSIs & Organ/Space SSIs • Includes only SSIs identified on Admission/Readmission to facility where procedure was originally performed • Includes only inpatient procedures • Used for the HAI Progress Report, published annually by CDC • Separate models for patient population (pediatric data is separated from adult data)
Complex 30-day SSI model (used for CMS IPPS)	• Includes only in-plan, inpatient COLO and HYST procedures in adult patients (specifically, ≥ 18 years of age) • Includes only deep incisional primary SSIs and organ/space SSIs with an event date within 30 days of the procedure • Includes SSIs identified on admission, readmission & via post-discharge surveillance • Used only for CMS IPPS reporting and for public reporting on Hospital Compare • Details of the SSI SIR models can be found in the SSI section of the SIR Guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf

For more information on how to generate a line listing report to determine SSI inclusion criteria, please see the quick reference guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/ssi-events-line-list-qrg.pdf

In addition to the SSI inclusion criteria listed above, there are a set of universal exclusion criteria that are applied to all procedures and associated events prior to the SIR calculation. Any procedure that meets any of the exclusion criteria is universally excluded from any SSI SIR calculation. The "Line List of Procedures Excluded from the SIR" is an NHSN analysis report that is intended to assist users in reviewing the procedures that are excluded from the SIRs and the reasons for the exclusion. Please refer to this quick reference guide, https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/line-list-procedures-excluded-sir.pdf to generate and interpret this report. This list of universal exclusion criteria, also called the universal exclusion criteria, applies to procedures regardless of the SSI model. Often, the reason for procedure exclusion from SIRs is due to data quality issues, which can be addressed, if applicable.

Table 6: Universal Exclusion Criteria for NHSN Operative Procedures

Universal Exclusion Criteria Variables	Definition of Variables
exclMissingVarInd	Procedure is excluded for missing risk factors used in risk adjustment of applicable procedure category for SSI models
exclMissingVarList	List of missing risk factors used in risk adjustment of applicable procedure category for SSI models
exclDurThresholdInd	Procedure excluded due to procedure duration being less than 5 minutes or exceeding the IQR5 value. Please see the list of procedure duration cutoff points in the SSI section of the SIR Guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf
exclAgeGT109Ind	Procedure is excluded if the patient's age at time of procedure is 109 years or older
exclOutpatientInd	Procedure excluded because it was reported as an outpatient procedure; **Note**: all outpatient procedures are excluded from the inpatient SSI SIRs calculated using the 2015 baseline. There is separate SIR reports for procedures performed in Hospital Outpatient Procedure Departments (HOPD).
exclPedIndcmpx30d	Procedures performed in pediatric patients are excluded from the Complex 30-day model
exclSexInd	Procedure excluded because sex was missing or not reported
exclInvalidJointRepHemi	Procedure is excluded if procedure code is KPRO or HPRO and (procedure type is a hemi joint replacement reported as a total revision or a total joint replacement reported as a partial revision) and procedure date is January 1, 2015-December 31, 2015.
exclBMIThresholdInd	Procedure is excluded if the adult patient's BMI is less than 12 or greater than 60. In pediatric patients < 18 years procedure is excluded if the biological plausibility value (BIV) for BMI is extreme based on the child's weight, height, sex, and age. The calculation of the BIV for BMI in pediatric patients is described in CDC's Growth Chart Training*. For instructions on how to enter height and weight on denominator form, please see: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/Reporting-Height-and-Weight-for-Procedures-508.pdf

*This BMI exclusion applies to all procedures on pediatric patients 2 years and older and less than 18, in both applicable SSI models (All SSI and Complex A/R). CDC Growth Charts are used to assess BMI in pediatric patients, calculated using height, weight, age and sex. More information can be found here: https://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm. Pediatric procedures with a calculated biological plausibility value of not equal to 0, is excluded from the SSI SIR.

NHSN Group Analysis:

NHSN Group Users can perform the same analysis as facility level users in NHSN. A few helpful tools in NHSN for groups are listed in the resources below. These tools are guides on how to start and join a Group; how to create a template to request data from facilities; how to determine the level of access granted by the facility following the previous steps, and how to analyze the facilities data.

Group Analysis Resources:

- NHSN Group Users weblink: https://www.cdc.gov/nhsn/group-users/index.html
- Group User's Guide to the Membership Rights Report:
  - https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/membership-rights-508.pdf
- Group User's Guide to the Line Listing- Participation Alerts:
  - https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/group-alerts.pdf
- Group User's Guide to Generating Participation Alerts
  - https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/participationalerts-dataset-508.pdf
  - https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/group-alerts.pdf

Additional Resources:

- Analysis Resources:
  - https://www.cdc.gov/nhsn/ps-analysis-resources/index.html
  - https://www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html
- NHSN Training: https://www.cdc.gov/nhsn/training/index.html

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APPENDIX A

Specific event types available for SSI attribution by NHSN procedure category

Operative Procedure Category	Specific Event Type
AAA - Abdominal aortic aneurysm repair	DIP - Deep Incisional Primary ENDO - Endocarditis GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary VASC - Arterial or venous infection
AMP - Limb amputation	BONE - Osteomyelitis DIP - Deep Incisional Primary JNT - Joint or bursa SIP - Superficial Incisional Primary
APPY - Appendix surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary
AVSD - AV shunt for dialysis	DIP - Deep Incisional Primary SIP - Superficial Incisional Primary VASC - Arterial or venous infection
BILI - Bile duct, liver or pancreatic surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary
BRST - Breast surgery	BRST - Breast abscess or mastitis DIP - Deep Incisional Primary DIS - Deep Incisional Secondary SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary
CARD - Cardiac surgery	BONE - Osteomyelitis CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract MED - Mediastinitis SIP - Superficial Incisional Primary VASC - Arterial or venous infection

Operative Procedure Category	Specific Event Type
CBGB - Coronary bypass with chest & donor incisions	BONE - Osteomyelitis CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary DIS - Deep Incisional Secondary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract MED - Mediastinitis SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary VASC - Arterial or venous infection
CBGC - Coronary bypass graft with chest incision	BONE - Osteomyelitis CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract MED - Mediastinitis SIP - Superficial Incisional Primary VASC - Arterial or venous infection
CEA - Carotid endarterectomy	DIP - Deep Incisional Primary DIS - Deep Incisional Secondary SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary VASC - Arterial or venous infection
CHOL - Gallbladder surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary
COLO - Colon surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection

Operative Procedure Category	Specific Event Type
CRAN - Craniotomy	BONE - Osteomyelitis DIP - Deep Incisional Primary IC - Intracranial infection MEN - Meningitis or ventriculitis SINU - Sinusitis SIP - Superficial Incisional Primary
CSEC - Cesarean section	DIP - Deep Incisional Primary EMET - Endometritis GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection
FUSN - Spinal fusion	BONE - Osteomyelitis DIP - Deep Incisional Primary DIS - Deep Incisional Secondary DISC - Disc space infection IAB - Intraabdominal, not specified elsewhere IC - Intracranial infection LUNG - Other infections of the lower respiratory tract MEN - Meningitis or ventriculitis SA - Spinal abscess/infection SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary
FX - Open reduction of fracture	BONE - Osteomyelitis DIP - Deep Incisional Primary JNT - Joint or bursa SIP - Superficial Incisional Primary
GAST - Gastric surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract SIP - Superficial Incisional Primary
HER - Herniorrhaphy	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary

Operative Procedure Category	Specific Event Type
HPRO - Hip prosthesis	BONE - Osteomyelitis DIP - Deep Incisional Primary PJI - Periprosthetic joint infection SIP - Superficial Incisional Primary
HTP - Heart transplant	BONE - Osteomyelitis CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract MED - Mediastinitis SIP - Superficial Incisional Primary VASC - Arterial or venous infection
HYST - Abdominal hysterectomy	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary VCUF - Vaginal cuff infection
KPRO - Knee prosthesis	BONE - Osteomyelitis DIP - Deep Incisional Primary PJI - Periprosthetic joint infection SIP - Superficial Incisional Primary
KTP - Kidney transplant	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection VASC - Arterial or venous infection
LAM - Laminectomy	BONE - Osteomyelitis DIP - Deep Incisional Primary DISC - Disc space infection IAB - Intraabdominal, not specified elsewhere IC - Intracranial infection MEN - Meningitis or ventriculitis SA - Spinal abscess/infection SIP - Superficial Incisional Primary

Operative Procedure Category	Specific Event Type
LTP - Liver transplant	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary VASC - Arterial or venous infection
NECK - Neck surgery	DIP - Deep Incisional Primary EAR - Ear, mastoid infection ORAL - Oral cavity infection (mouth, tongue, or gums) SIP - Superficial Incisional Primary UR - Upper respiratory tract infection, pharyngitis, laryngitis, epiglottitis
NEPH - Kidney surgery	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection
OVRY - Ovarian surgery	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection
PACE - Pacemaker surgery	CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary VASC - Arterial or venous infection
PRST - Prostate surgery	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection

Operative Procedure Category	Specific Event Type
PVBY - Peripheral vascular bypass surgery	DIP - Deep Incisional Primary DIS - Deep Incisional Secondary SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary VASC - Arterial or venous infection
REC - Rectal surgery	DIP - Deep Incisional Primary DIS - Deep Incisional Secondary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary USI - Urinary System Infection
SB - Small bowel surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection
SPLE - Spleen surgery	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary
THOR - Thoracic surgery	BONE - Osteomyelitis BRST - Breast abscess or mastitis DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract SIP - Superficial Incisional Primary
THYR - Thyroid and/or parathyroid surgery	DIP - Deep Incisional Primary EAR - Ear, mastoid infection GIT - Gastrointestinal tract SIP - Superficial Incisional Primary UR - Upper respiratory tract infection, pharyngitis, laryngitis, epiglottitis

Operative Procedure Category	Specific Event Type
VHYS - Vaginal hysterectomy	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection VCUF - Vaginal cuff infection
VSHN - Ventricular shunt	BONE - Osteomyelitis DIP - Deep Incisional Primary DIS - Deep Incisional Secondary IAB - Intraabdominal, not specified elsewhere IC - Intracranial infection LUNG – Other infections of the lower respiratory tract MEN - Meningitis or ventriculitis SA - Spinal abscess/infection SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary
XLAP - Exploratory laparotomy	DIP - Deep Incisional Primary EMET - Endometritis GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection

APPENDIX B

Guidance for Multiple Procedure Reporting

This table addresses the 12 NHSN operative procedure categories that are included in Denominator for Reporting Instruction #6 - Same NHSN operative procedure category via separate incisions: AMP, BRST, CEA, FUSN, FX, HER, HPRO, KPRO, LAM, NEPH, OVRY, PVBY. The instruction provides guidance on correct procedure reporting when multiple procedures from one of these categories (procedures from the same category) are performed via separate incisions per patient per calendar day. The table includes the maximum number of procedures per day per patient and an explanation.

Operative Procedure Category	Maximum # Of Procedures Per Day	Explanation
AMP - Limb amputation	4	Corresponds to the four (4) extremities (left arm, left leg, right arm, right leg). In instances where multiple AMP procedures are performed on the same extremity only one AMP procedure should be reported for that extremity.
BRST - Breast surgery	2	Corresponds to the left breast and right breast.
CEA - Carotid endarterectomy	2	Corresponds to the left artery and right artery.
FUSN - Spinal fusion	4	Corresponds to the four (4) anatomical spinal levels (cervical, thoracic, lumbar, sacral). When more than one anatomical spinal level is fused, report the NHSN spinal level and approach **in which the most vertebrae were fused**. The number of FUSN procedures reported depends on various factors: • When a spinal fusion procedure is performed on one spinal level/contiguous spinal levels, this is considered **one FUSN** procedure for reporting purposes although multiple joints may be fused and multiple procedures codes are assigned. • When an anterior and posterior incision are made to access one spinal level/contiguous spinal levels (such as C3-C5 spinal fusion with anterior and posterior approach) **one FUSN** procedure is reported. Indicate **'Anterior and Posterior' approach** on the denominator for procedure form.

Operative Procedure Category	Maximum # Of Procedures Per Day	Explanation
		• When distinct levels/sections of the spine are fused using different incisions on non-contiguous spinal levels (such as an incision made in the cervical spine and an incision made in the lumbar spine) enter as separate denominators (**two FUSN** denominator for procedure forms should be completed).
FX - Open reduction of fracture	4	Corresponds to the four (4) extremities (right arm, right leg, left arm, left leg). In instances where multiple FX procedures are performed on the same extremity only one FX procedure should be reported for that extremity.
HER - Herniorrhaphy	5	Corresponds to five (5) hernias. Laparoscopic hernia repairs are considered one HER procedure, regardless of the number of hernias repaired in that trip to the OR. In most cases there will be only one incision time documented for this procedure. If more than one time is documented, total the durations. Open (specifically, non-laparoscopic) hernia repairs are reported as one HER procedure for each hernia repaired via a separate incision. For example: • If one incision is made to repair two defects, then report one HER procedure. • If two incisions are made to repair two defects, then report two HER procedures. It is anticipated that separate incision times will be recorded for these procedures. If not, take the total time for both procedures and split it evenly between the two.
HPRO - Hip prosthesis	2	Corresponds to the left hip and right hip.
KPRO - Knee prosthesis	2	Corresponds to the left knee and right knee.
LAM - Laminectomy	2	Corresponds to two (2) LAM procedures [each at different spinal levels].
NEPH - Kidney surgery	2	Corresponds to the left kidney and right kidney.
OVRY - Ovarian surgery	2	Corresponds to the left ovary and right ovary.
PVBY - Peripheral vascular bypass surgery	4	Corresponds to four (4) PVBY procedures.